

# SEQUENCE LISTING

<110> Harberd, Nicholas P  
Peng, Jinrong  
Carol, Pierre  
Richards, Donald E

<120> Nucleic acid encoding GAI gene of Arabidopsis thaliana

<130> 620-157

<140>

<141> 2001-07-25

<150> US 09/117,853

<151> 1998-08-12

<150> PCT/GB97/00390

<151> 1997-02-12

<150> GB 9602796.6

<151> 1996-02-12

<160> 12

<170> PatentIn Ver. 2.0

<210> 1

<211> 1964

<212> DNA

<213> Arabidopsis thaliana

<400> 1

```

taataatcat tttttttctt ataaccttcc tctctatatt tacaatttat tttgttatta 60
gaagtggtag tggagtgaaa aaacaaatcc taagcagtc taaccgatcc ccgaagctaa 120
agattcttca ccttcccaaa taaagcaaaa cctagatccg acattgaagg aaaaaccttt 180
tagatccatc tctgaaaaaa aaccaacctat gaagagagat catcatcatc atcatcaaga 240
taagaagact atgatgatga atgaagaaga cgacggtaac ggcattggatg agcttctagc 300
tgttcttggt tacaagggtt gggtcatcgg aatggctgat gttgctcaga aactcgagca 360
gcttgaagtt atgatgtcta atgttcaaga agacgatctt tctcaactcg ctactgagac 420
tgttccactat aatccggcgg agctttacac gtggcttgat tctatgctca ccgaccttaa 480
tcctccgctg tctaacgcgg agtacgatct taaagctatt cccggtgacg cgattctcaa 540
tcagttcgct atcgattcgg cttcttcgtc taaccaaggc ggccggaggag atacgtatac 600
tacaacaagc cgggtgaaat gctcaaacgg cgtcgtggaa accaccacag cgacggctga 660
gtcaactcgg catgttgctc tgggtgactc gcaggagaa ggtgtgctgc tcgttcacgc 720
gcttttggtc tgcgctgaag ctgttcagaa ggagaatctg actgtggcgg aagctctggt 780
gaagcaaatc ggattcttag ctgtttctca aatcggagct atgagaaaag tcgctactta 840
cttcgccgaa gctctcgcgc ggccgattta ccgtctctct ccgtcgcaga gtccaatcga 900
ccactctctc tccgatactc ttcagatgca cttctacgag acttgctcct atctcaagtt 960
cgctcacttc acggcgaatc aagcgattct cgaagctttt caagggaaga aaagagttca 1020
tgtcattgat ttctctatga gtcaagggtc tcaatggccg gcgcttatgc aggctcttgc 1080
gcttcgacct ggtggctctc ctgttttccg gtttaaccgga attgggtccac cggcaccgga 1140
taatttcgat tatcttcatg aagttgggtg taagctggct cattagctg aggcgattca 1200
cgttgagttt gagtacagag gatttgtggc taacacttta gctgatcttg atgcttcgat 1260
gcttgagctt agaccaagtg agattgaatc tgttgccggt aactctgttt tcgagcttca 1320
caagctcttg ggacgacctg gtgcgatcga taaggttctt ggtgtggtga atcagattaa 1380
accggagatt ttcactgtgg ttgagcagga atcgaaacct aatagtcgga ttttcttaga 1440
tcggtttact gagtcggtgc attattactc gacgttggtt gactcgttgg aaggtgtacc 1500
gagtggtcaa gacaagggtc tgctcggagg ttacttgggt aaacagatct gcaacgttgt 1560
ggcttgtgat ggacctgacc gagttgagcg tcatgaaacg ttgagtcagt ggaggaaccg 1620

```



Asn Gln Ala Ile Leu Glu Ala Phe Gln Gly Lys Lys Arg Val His Val  
 260 265 270  
 Ile Asp Phe Ser Met Ser Gln Gly Leu Gln Trp Pro Ala Leu Met Gln  
 275 280 285  
 Ala Leu Ala Leu Arg Pro Gly Gly Pro Pro Val Phe Arg Leu Thr Gly  
 290 295 300  
 Ile Gly Pro Pro Ala Pro Asp Asn Phe Asp Tyr Leu His Glu Val Gly  
 305 310 315 320  
 Cys Lys Leu Ala His Leu Ala Glu Ala Ile His Val Glu Phe Glu Tyr  
 325 330 335  
 Arg Gly Phe Val Ala Asn Thr Leu Ala Asp Leu Asp Ala Ser Met Leu  
 340 345 350  
 Glu Leu Arg Pro Ser Glu Ile Glu Ser Val Ala Val Asn Ser Val Phe  
 355 360 365  
 Glu Leu His Lys Leu Leu Gly Arg Pro Gly Ala Ile Asp Lys Val Leu  
 370 375 380  
 Gly Val Val Asn Gln Ile Lys Pro Glu Ile Phe Thr Val Val Glu Gln  
 385 390 395 400  
 Glu Ser Asn His Asn Ser Pro Ile Phe Leu Asp Arg Phe Thr Glu Ser  
 405 410 415  
 Leu His Tyr Tyr Ser Thr Leu Phe Asp Ser Leu Glu Gly Val Pro Ser  
 420 425 430  
 Gly Gln Asp Lys Val Met Ser Glu Val Tyr Leu Gly Lys Gln Ile Cys  
 435 440 445  
 Asn Val Val Ala Cys Asp Gly Pro Asp Arg Val Glu Arg His Glu Thr  
 450 455 460  
 Leu Ser Gln Trp Arg Asn Arg Phe Gly Ser Ala Gly Phe Ala Ala Ala  
 465 470 475 480  
 His Ile Gly Ser Asn Ala Phe Lys Gln Ala Ser Met Leu Leu Ala Leu  
 485 490 495  
 Phe Asn Gly Gly Glu Gly Tyr Arg Val Glu Glu Ser Asp Gly Cys Leu  
 500 505 510  
 Met Leu Gly Trp His Thr Arg Pro Leu Ile Ala Thr Ser Ala Trp Lys  
 515 520 525  
 Leu Ser Thr Asn  
 530

<210> 3

<211> 1643

<212> DNA

<213> Arabidopsis thaliana

<400> 3

```

tagaagtgggt agtggagtgga aaaaacaaat cctaagcagt cctaaccgat ccccgaaagct 60
aaagatttctt caccttccca aataaagcaa aacctagatc cgacattgaa ggaaaaacct 120
tttagatcca tctctgaaaa aaaaccaacc atgaagagag atcatcatca tcatcatcaa 180
gataagaaga ctatgatgat gaatgaagaa gacgacggta acggcatgga tgttgctcag 240
aaactcgagc agcttgaagt tatgatgtct aatgttcaag aagacgatct ttctcaactc 300
gctactgaga ctgttcacta taatccggcg gagctttaca cgtggcttga ttctatgctc 360
accgacctta atcctccgtc gtctaacgcc gagtacgatc ttaaagctat tcccgggtgac 420
gcgattctca atcagttcgc tatcgattcg gcttcttcgt ctaaccaagg cggcgggagga 480
gatacgtata ctacaaacaa gcggttgaaa tgctcaaacg gcgtcgtgga aaccaccaca 540
gcgacggctg agtcaactcg gcatgttgtc ctggttgact cgcaggagaa cgggtgtgct 600
ctcggttcacg cgcttttggc ttgctgtgaa gctgttcaga aggagaatct gactgtggcg 660
gaagctctgg tgaagcaa atcggttctta gctgtttctc aaatcggagc tatgagaaaa 720
gtcgctactt acttcgccga agctctcgcg cggcggattt accgtctctc tccgtcgag 780
agtccaatcg accactctct ctccgatact cttagatgc acttctacga gacttgtcct 840
tatctcaagt tcgctcactt cacggcgaa caagcgattc tcgaagcttt tcaagggaag 900
aaaagagttc atgctcattga tttctctatg agtcaaggtc ttcaatggcc ggcgcttatg 960
caggctcttg cgcttcgacc tgggtgtcct cctgttttcc ggtaaccgg aattgggtcca 1020
ccggcaccgg ataatttcga ttatcttcat gaagtgggt gtaagctggc tcathtagct 1080
gaggcgattc acgttgagtt tgagtacaga ggatttggg ctaacacttt agctgatctt 1140
gatgcttcga tgcttgagct tagaccaagt gagattgaat ctgttgcggt taactctggt 1200
ttcgagcttc acaagctctt gggacgacct ggtgcgatcg ataaggttct tgggtgtggtg 1260
aatcagatta aaccggagat tttcactgtg cttgagcagg aatcgaacca taatagtccg 1320
atcttcttag atcggtttac tgagtcgttg cattattact cgacgttggt tgactcggtg 1380
gaaggtgtac cgagtgggtc agacaaggtc atgtcggagg tttacttggg taaacagatc 1440
tgcaacgttg tggcttggtg tggacctgac cgagttgagc gtcatgaaac gttgagtcag 1500
tggaggaacc ggttcgggtc tgctgggttt gcggtgcac atattggttc gaatgcgttt 1560
aagcaagcga gtatgctttt ggctctgttc aacggcggtg aggggttatcg ggtggaggag 1620
agtgcaggct gtctcatggt ggg                                     1643

```

<210> 4

<211> 221

<212> PRT

<213> Arabidopsis thaliana

<400> 4

```

Met Lys Arg Asp His His His His His Gln Asp Lys Lys Thr Met Met
  1                      5                      10                      15

```

```

Met Asn Glu Glu Asp Asp Gly Asn Gly Met Asp Val Ala Gln Lys Leu
          20                      25                      30

```

```

Glu Gln Leu Glu Val Met Met Ser Asn Val Gln Glu Asp Asp Leu Ser
          35                      40                      45

```

```

Gln Leu Ala Thr Glu Thr Val His Tyr Asn Pro Ala Glu Leu Tyr Thr
          50                      55                      60

```

```

Trp Leu Asp Ser Met Leu Thr Asp Leu Asn Pro Pro Ser Ser Asn Ala
          65                      70                      75                      80

```

```

Glu Tyr Asp Leu Lys Ala Ile Pro Gly Asp Ala Ile Leu Asn Gln Phe
          85                      90                      95

```

```

Ala Ile Asp Ser Ala Ser Ser Ser Asn Gln Gly Gly Gly Gly Asp Thr
          100                      105                      110

```

```

Tyr Thr Thr Asn Lys Arg Leu Lys Cys Ser Asn Gly Val Val Glu Thr
          115                      120                      125

```

```

Thr Thr Ala Thr Ala Glu Ser Thr Arg His Val Val Leu Val Asp Ser
          130                      135                      140

```

Gln Glu Asn Gly Val Arg Leu Val His Ala Leu Leu Ala Cys Ala Glu  
 145 150 155 160

Ala Val Gln Lys Glu Asn Leu Thr Val Ala Glu Ala Leu Val Lys Gln  
 165 170 175

Ile Gly Phe Leu Ala Val Ser Gln Ile Gly Ala Met Arg Lys Val Ala  
 180 185 190

Thr Tyr Phe Ala Glu Ala Leu Ala Arg Arg Ile Tyr Arg Leu Ser Pro  
 195 200 205

Ser Gln Ser Pro Ile Asp His Ser Leu Ser Asp Thr Leu  
 210 215 220

<210> 5  
 <211> 1642  
 <212> DNA  
 <213> Arabidopsis thaliana

<400> 5  
 tagaagtgggt agtggagtgga aaaaacaaat cctaagcagt cctaaccgat ccccggaagct 60  
 aaagattctt caccttccca aataaagcaa aacctagatc cgacattgaa ggaaaaacct 120  
 tttagatcca tctctgaaaa aaaaccaacc atgaagagag atcatcatca tcatcatcaa 180  
 gataagaaga ctatgatgat gaatgaagaa gacgacggtg acggcatgga tgttgctcag 240  
 aaactcgagc agcttgaagt tatgatgtct aatgttcaag aagacgatct ttctcaactc 300  
 gctactgaga ctgttcaacta taatccggcg gagctttaca cgtggcttga ttctatgctc 360  
 accgacctta atcctccgctc gtctaacgcc gactacgatc ttaaagctat tcccggtgac 420  
 gcgatttctca atcagttcgc tatcgattcg gcttcttcgt ctaaccaagg cggcgaggga 480  
 gatacgtata ctacaaacaa gcggttgaaa tgctcaaacg gcgtcgtgga aaccaccaca 540  
 gcgacggctg agtcaactcg gcatgttgctc ctggttgact cgcaggagaa cgggtgtgct 600  
 ctggttcacg cgcttttggc ttgctgtgaa gctgttcaga aggagaatct gactgtggcg 660  
 gaagctctgg tgaagcaa atcggattctta gctgtttctc aaatcggagc tatgagaaaa 720  
 gtcgctactt acttcgccga agctctcgcg cggcggtatt accgtctctc tccgtcgag 780  
 agtccaatcg accactctct ctccgatact cttcagatgc acttctacga gacttgtcct 840  
 tatctcaagt tcgctcactt cacggcgaa caagcgattc tcgaagcttt tcaagggaag 900  
 aaaagagttc atgtcattga ttctctatga gtcaagggtc tcaatggccg gcgcttatgc 960  
 aggcctcttg gcctcgacct ggtggtcctc ctggtttccg gttaaccgga attggtccac 1020  
 cggcaccgga taatttcgat tatcttcacg aagttgggtg taagctggct catttagctg 1080  
 aggcgattca cggttgagttt gagtacagag gatttggtgc taacacttta gctgatcttg 1140  
 atgcttcgat gcttgagctt agaccaagtg agattgaatc tgttgcggtt aactctggtt 1200  
 tcgagcttca caagctcttg ggacgacctg gtgcgatcga taaggttctt ggtgtggtga 1260  
 atcagattaa accggagatt ttcactgtgg ttgagcagga atcgaaccat aatagtccga 1320  
 ttttcttaga tcggtttact gagtcgttgc attattactc gacgttggtt gactcgttgg 1380  
 aaggtgtacc gagtgggtcaa gacaagggtc tgtcggaggt ttacttgggt aacagatct 1440  
 gcaacgttgt ggcttggtgat ggacctgacc gagttgagcg tcatgaaacg ttgagtcagt 1500  
 ggaggaaccg gttcgggtct gctgggtttg cggctgcaca tattggttcg aatgcgttta 1560  
 agcaagcgag tatgcttttg gctctgttca acggcggtga gggttatcgg gtggaggaga 1620  
 gtgacggctg tctcatgttg gg 1642

<210> 6  
 <211> 259  
 <212> PRT  
 <213> Arabidopsis thaliana

<400> 6  
 Met Lys Arg Asp His His His His His Gln Asp Lys Lys Thr Met Met  
 1 5 10 15

Met	Asn	Glu	Glu	Asp	Asp	Gly	Asn	Gly	Met	Asp	Val	Ala	Gln	Lys	Leu	20	25	30
Glu	Gln	Leu	Glu	Val	Met	Met	Ser	Asn	Val	Gln	Glu	Asp	Asp	Leu	Ser	35	40	45
Gln	Leu	Ala	Thr	Glu	Thr	Val	His	Tyr	Asn	Pro	Ala	Glu	Leu	Tyr	Thr	50	55	60
Trp	Leu	Asp	Ser	Met	Leu	Thr	Asp	Leu	Asn	Pro	Pro	Ser	Ser	Asn	Ala	65	70	75
Glu	Tyr	Asp	Leu	Lys	Ala	Ile	Pro	Gly	Asp	Ala	Ile	Leu	Asn	Gln	Phe	85	90	95
Ala	Ile	Asp	Ser	Ala	Ser	Ser	Ser	Asn	Gln	Gly	Gly	Gly	Gly	Asp	Thr	100	105	110
Tyr	Thr	Thr	Asn	Lys	Arg	Leu	Lys	Cys	Ser	Asn	Gly	Val	Val	Glu	Thr	115	120	125
Thr	Thr	Ala	Thr	Ala	Glu	Ser	Thr	Arg	His	Val	Val	Leu	Val	Asp	Ser	130	135	140
Gln	Glu	Asn	Gly	Val	Arg	Leu	Val	His	Ala	Leu	Leu	Ala	Cys	Ala	Glu	145	150	155
Ala	Val	Gln	Lys	Glu	Asn	Leu	Thr	Val	Ala	Glu	Ala	Leu	Val	Lys	Gln	165	170	175
Ile	Gly	Phe	Leu	Ala	Val	Ser	Gln	Ile	Gly	Ala	Met	Arg	Lys	Val	Ala	180	185	190
Thr	Tyr	Phe	Ala	Glu	Ala	Leu	Ala	Arg	Arg	Ile	Tyr	Arg	Leu	Ser	Pro	195	200	205
Ser	Gln	Ser	Pro	Ile	Asp	His	Ser	Leu	Ser	Asp	Thr	Leu	Gln	Met	His	210	215	220
Phe	Tyr	Glu	Thr	Cys	Pro	Tyr	Leu	Lys	Phe	Ala	His	Phe	Thr	Ala	Asn	225	230	235
Gln	Ala	Ile	Leu	Glu	Ala	Phe	Gln	Gly	Lys	Lys	Arg	Val	His	Val	Ile	245	250	255
Asp	Ser	Leu																

```
<210> 7
<211> 1636
<212> DNA
<213> Arabidopsis thaliana
```

**Abstract**

<211> 282

<213> Arabidopsis thaliana

```

<400> 8
Met Lys Arg Asp His His His His His Gln Asp Lys Lys Thr Met Met
  1                               10                      15

```

Glu Gln Leu Glu Val Met Met Ser Asn Val Gln Glu Asp Asp Leu Ser  
35 40 45

Trp Leu Asp Ser Met Leu Thr Asp Leu Asn Pro Pro Ser Ser Asn Ala  
65 70 75 80

Ala Ile Asp Ser Ala Ser Ser Ser Asn Gln Gly Gly Gly Gly Asp Thr  
100 105 110

Thr Thr Ala Thr Ala Glu Ser Thr Arg His Val Val Leu Val Asp Ser  
130 135 140

Ala Val Gln Lys Glu Asn Leu Thr Val Ala Glu Ala Leu Val Lys Gln  
165 170 175

Ile Gly Phe Leu Ala Val Ser Gln Ile Gly Ala Met Arg Lys Val Ala  
 180 185 190  
 Thr Tyr Phe Ala Glu Ala Leu Ala Arg Arg Ile Tyr Arg Leu Ser Pro  
 195 200 205  
 Ser Gln Ser Pro Ile Asp His Ser Leu Ser Asp Thr Leu Gln Met His  
 210 215 220  
 Phe Tyr Glu Thr Cys Pro Tyr Leu Lys Phe Ala His Phe Thr Ala Asn  
 225 230 235 240  
 Gln Ala Ile Leu Glu Ala Phe Gln Gly Lys Lys Arg Val His Val Ile  
 245 250 255  
 Asp Phe Ser Met Ser Gln Gly Leu Gly Arg Leu Cys Arg Leu Leu Arg  
 260 265 270  
 Phe Asp Leu Val Val Leu Leu Phe Ser Gly  
 275 280

<210> 9  
 <211> 1642  
 <212> DNA  
 <213> Arabidopsis thaliana

<400> 9  
 tagaagtgggt agtggagtga aaaaacaaat cctaagcagt cctaaccgat ccccgaagct 60  
 aaagattctt caccctccca aataaagcaa aacctagatc cgacattgaa ggaaaaacct 120  
 tttagatcca tctctgaaaa aaaaccaacc atgaagagag atcatcatca tcatcatcaa 180  
 gataagaaga ctatgatgat gaatgaagaa gacgacggta acggcatgga tgttgctcag 240  
 aaactcgagc agcttgaagt tatgatgtct aatgttcaag aagacgatct ttctcaactc 300  
 gctactgaga ctgttcacta taatccggcg gagctttaca cgtggcttga ttctatgctc 360  
 accgacctta atcctccgtc gtctaacgcc gagtacgatc ttaaagctat tcccggtgac 420  
 gcgattctca atcagttcgc tatcgattcg gcttcttcgt ctaaccaagg cggcggagga 480  
 gatacgatata ctacaaacaa gcggttgaaa tgctcaaacg gcgtcgtgga aaccaccaca 540  
 gcgacggctg agtcaactcg gcatgtgtcc tggttgactc gcaggagaac ggtgtgcgtc 600  
 tcgttcacgc gcttttggct tgcgctgaag ctgttcagaa ggagaatctg actgtggcgg 660  
 aagctctggt gaagcaaata ggattcttag ctgtttctca aatcggagct atgagaaaag 720  
 tcgctactta cttcgccgaa gctctcgcgc ggcggattta ccgtctctct ccgtcgcaga 780  
 gtccaatcga ccactctctc tccgatactc ttcagatgca cttctacgag acttgtcctt 840  
 atctcaagtt cgctcaactc acggcgaata aagcgattct cgaagctttt caagggaaga 900  
 aaagagttca tgtcattgat ttctctatga gtcaaggctc tcaatggccg gcgcttatgc 960  
 aggctcttgc gcttcgacct ggtggctctc ctgttttccg gttaaccgga attgggtccac 1020  
 cggcaccgga taatttcgat tatcttcatt aagttgggtg taagctggct catttagctg 1080  
 aggcgattca cgttgagttt gactacagag gatttgtggc taacacttta gctgatcttg 1140  
 atgcttcgat gcttgagctt agaccaagtg agattgaatc tgttgcggtt aactctgttt 1200  
 tcgagcttca caagctcttg ggacgacctg gtgcgatcga taaggttctt ggtgtggtga 1260  
 atcagattaa accggagatt ttcactgtgg ttgagcagga atcgaacat aatagtcgga 1320  
 ttttcttaga tcggtttact gagtcgttgc attattactc gacgttggtt gactcgttgg 1380  
 aaggtgtacc gagtgggtcaa gacaagggtc tgctggagggt ttacttgggt aaacagatct 1440  
 gcaacgttgt ggcttgtgat ggacctgacc cagttgagcg tcatgaaacg ttgagtcagt 1500  
 ggaggaaccg gttcgggtct gctgggtttg gcgctgcaca tattggttcg aatgcgttta 1560  
 agcaagcgag tatgcttttg gctctgttca acggcgggtg gggttatcgg gtggaggaga 1620  
 gtgacggctg tctcatgttg gg 1642

<210> 10  
 <211> 166  
 <212> PRT



<213> Arabidopsis thaliana

<400> 10

Met Lys Arg Asp His His His His His Gln Asp Lys Lys Thr Met Met  
1 5 10 15

Met Asn Glu Glu Asp Asp Gly Asn Gly Met Asp Val Ala Gln Lys Leu  
20 25 30

Glu Gln Leu Glu Val Met Met Ser Asn Val Gln Glu Asp Asp Leu Ser  
35 40 45

Gln Leu Ala Thr Glu Thr Val His Tyr Asn Pro Ala Glu Leu Tyr Thr  
50 55 60

Trp Leu Asp Ser Met Leu Thr Asp Leu Asn Pro Pro Ser Ser Asn Ala  
65 70 75 80

Glu Tyr Asp Leu Lys Ala Ile Pro Gly Asp Ala Ile Leu Asn Gln Phe  
85 90 95

Ala Ile Asp Ser Ala Ser Ser Ser Asn Gln Gly Gly Gly Gly Asp Thr  
100 105 110

Tyr Thr Thr Asn Lys Arg Leu Lys Cys Ser Asn Gly Val Val Glu Thr  
115 120 125

Thr Thr Ala Thr Ala Glu Ser Thr Arg His Val Ser Trp Leu Thr Arg  
130 135 140

Arg Arg Thr Val Cys Val Ser Phe Thr Arg Phe Trp Leu Ala Leu Lys  
145 150 155 160

Leu Phe Arg Arg Arg Ile  
165

<210> 11

<211> 15

<212> DNA

<213> Arabidopsis thaliana

<400> 11

tagaagtggg agtgg

15

<210> 12

<211> 16

<212> DNA

<213> Arabidopsis thaliana

<400> 12

accatgagac cagccg

16

099464-0994